What is claimed is:

1   1. A storage apparatus having a plurality of round

2 storage areas, on each of which a plurality of servo frames

3 are arranged at uniform intervals in a spoke-like pattern,

4 said apparatus comprising:

5   an index bit storing section provided to each said

6 servo frame arranged in each individual one of said plurality

7 of storage areas, said index bit storing section storing,

8 as an index bit, part of an index pattern having a specific

9 bit pattern, which index pattern is operable to identify

10 the individual storage area;

11   an index bit obtaining unit for obtaining such index

12 bits, each of which is stored in the index bit storing section

13 of each said servo frame arranged in the individual storage

14 area, one after another; and

15   a storage area recognizing unit for recognizing the

16 individual storage area based on the index bits, which are

17 obtained by said index bit obtaining unit,

18   the index bits, each of which is stored in the index

19 bit storing section of each said servo frame arranged in

20 the individual storage area, being adapted to form, when

21 being sequentially arranged, an index bit string which

22 includes a plurality of index patterns each having the

23 specific bit pattern.

1   2. A storage apparatus as set forth in claim 1, wherein

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2 each of said plurality of storage areas is associated with

3 such index pattern that is unique to each said storage area.

1   3. A storage apparatus as set forth in claim 2, wherein

2 hamming distance between any two of the index patterns, which

3 index patterns are associated one with each of said storage

4 areas, is a predetermined value or greater.

1   4. A storage apparatus as set forth in claim 1 further

2 comprising:

3   a provisional index pattern obtaining unit for

4   obtaining a provisional index pattern based on the index

5   bits obtained by said index bit obtaining unit;

6   a first hamming distance calculator for calculating

7   hamming distances between the provisional index pattern,

8   which is obtained by said provisional index pattern

9   obtaining unit, and the index patterns; and

10   an index pattern verifying unit for verifying that

11   the provisional index pattern is such index pattern, based

12   on the hamming distances, which are calculated by said first

13   hamming distance calculator,

14   said storage area recognizing unit recognizing the

15   individual storage area based on the index pattern which

16   is verified by said index pattern verifying unit.

1   5. A storage apparatus as set forth in claim 2 further

2 comprising:

3   a provisional index pattern obtaining unit for

4   obtaining a provisional index pattern based on the index

5   bits obtained by said index bit obtaining unit;

6   a first hamming distance calculator for calculating

7   hamming distances between the provisional index pattern,

8   which is obtained by said provisional index pattern

9   obtaining unit, and the index patterns; and

10   an index pattern verifying unit for verifying that

11   the provisional index pattern is such index pattern, based

12   on the hamming distances, which are calculated by said first

13   hamming distance calculator,

14   said storage area recognizing unit recognizing the

15   individual storage area based on the index pattern which

16   is verified by said index pattern verifying unit.

1   6.   A storage apparatus as set forth in claim 3 further

2   comprising:

3   a provisional index pattern obtaining unit for

4   obtaining a provisional index pattern based on the index

5   bits obtained by said index bit obtaining unit;

6   a first hamming distance calculator for calculating

7   hamming distances between the provisional index pattern,

8   which is obtained by said provisional index pattern

9   obtaining unit, and the index patterns; and

10   an index pattern verifying unit for verifying that

11   the provisional index pattern is such index pattern, based

12   on the hamming distances, which are calculated by said first

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13   hamming distance calculator,

14   said storage area recognizing unit recognizing the

15   individual storage area based on the index pattern which

16   is verified by said index pattern verifying unit.

1   7. A storage apparatus as set forth in claim 1, further

2   comprising:

3   a sector bit storing section provided to each said

4   servo frame arranged in each said storage areas, said sector

5   bit storing section storing, as a sector bit, part of a sector

6   pattern which is operable to identify a position of such

7   index pattern in the individual storage area, in association

8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector

10   bit from the sector bit storing section of each said servo

11   frame arranged in the individual storage area, one after

12   another; and

13   a position recognizing unit for recognizing a position

14   of each said servo frame in the individual storage area based

15   on such sector bits obtained by said sector bit obtaining

16   unit.

1   8. A storage apparatus as set forth in claim 2, further

2   comprising:

3   a sector bit storing section provided to each said

4   servo frame arranged in each said storage areas, said sector

5   bit storing section storing, as a sector bit, part of a sector

6   pattern which is operable to identify a position of such

7   index pattern in the individual storage area, in association

8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector

10   bit from the sector bit storing section of each said servo

11   frame arranged in the individual storage area, one after

12   another; and

13   a position recognizing unit for recognizing a position

14   of each said servo frame in the individual storage area based

15   on such sector bits obtained by said sector bit obtaining

16   unit.

1   9.   A storage apparatus as set forth in claim 3, further

2   comprising:

3   a sector bit storing section provided to each said

4   servo frame arranged in each said storage areas, said sector

5   bit storing section storing, as a sector bit, part of a sector

6   pattern which is operable to identify a position of such

7   index pattern in the individual storage area, in association

8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector

10   bit from the sector bit storing section of each said servo

11   frame arranged in the individual storage area, one after

12   another; and

13   a position recognizing unit for recognizing a position

14   of each said servo frame in the individual storage area based

15   on such sector bits obtained by said sector bit obtaining

16   unit.

1   10.   A storage apparatus as set forth in claim 4,

2   further comprising:

3   a sector bit storing section provided to each said

4   servo frame arranged in each said storage areas, said sector

5   bit storing section storing, as a sector bit, part of a sector

6   pattern which is operable to identify a position of such

7   index pattern in the individual storage area, in association

8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector

10   bit from the sector bit storing section of each said servo

11   frame arranged in the individual storage area, one after

12   another; and

13   a position recognizing unit for recognizing a position

14   of each said servo frame in the individual storage area based

15   on such sector bits obtained by said sector bit obtaining

16   unit.

1   11.   A storage apparatus as set forth in claim 5,

2   further comprising:

3   a sector bit storing section provided to each said

4   servo frame arranged in each said storage areas, said sector

5   bit storing section storing, as a sector bit, part of a sector

6   pattern which is operable to identify a position of such

7   index pattern in the individual storage area, in association

8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector
10 bit from the sector bit storing section of each said servo
11 frame arranged in the individual storage area, one after
12 another; and

13   a position recognizing unit for recognizing a position
14 of each said servo frame in the individual storage area based
15 on such sector bits obtained by said sector bit obtaining
16 unit.

1   12. A storage apparatus as set forth in claim 6,
2   further comprising:

3   a sector bit storing section provided to each said
4   servo frame arranged in each said storage areas, said sector
5   bit storing section storing, as a sector bit, part of a sector
6   pattern which is operable to identify a position of such
7   index pattern in the individual storage area, in association
8   with corresponding index bit storing section;

9   a sector bit obtaining unit for obtaining such sector
10 bit from the sector bit storing section of each said servo
11 frame arranged in the individual storage area, one after
12 another; and

13   a position recognizing unit for recognizing a position
14 of each said servo frame in the individual storage area based
15 on such sector bits obtained by said sector bit obtaining
16 unit.

1   13. A storage apparatus as set forth in claim 7,

2 wherein, in each said storage area, each of said plurality

3 of index patterns is associated with a unique sector pattern

4 that is unique to each said index pattern.

1   14. A storage apparatus as set forth in claim 10,

2 wherein, in each said storage area, each of said plurality

3 of index patterns is associated with a unique sector pattern

4 that is unique to each said index pattern.

1   15. A storage apparatus as set forth in claim 13,

2 wherein hamming distance between any two of the unique sector

3 patterns, which are associated one with each of said index

4 patterns, is a predetermined value or greater.

1   16. A storage apparatus as set forth in claim 14,

2 wherein hamming distance between any two of the unique sector

3 patterns, which are associated one with each of said index

4 patterns, is a predetermined value or greater.

1   17. A storage apparatus as set forth in claim 4,

2 further comprising:

3   a provisional sector pattern obtaining unit for

4 obtaining a provisional sector pattern based on the sector

5 bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7 hamming distance between the provisional sector pattern,

8 which is obtained by said provisional sector pattern

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9 obtaining unit, and the sector pattern; and

10 a sector pattern verifying unit for verifying that
11 the provisional sector pattern is such sector pattern, based
12 on the hamming distance, which is calculated by said first
13 hamming distance calculator,

14 said position recognizing unit recognizing, based on
15 the sector pattern that is verified by said sector pattern
16 verifying unit, a position of each said servo frame in the
17 individual storage area, each said servo frame having such
18 sector bit storing section each storing individual sector
19 bit that is part of the provisional sector pattern.

1 18. A storage apparatus as set forth in claim 5,
2 further comprising:

3 a provisional sector pattern obtaining unit for
4 obtaining a provisional sector pattern based on the sector
5 bits obtained by said sector bit obtaining unit;

6 a second hamming distance calculator for calculating
7 hamming distance between the provisional sector pattern,
8 which is obtained by said provisional sector pattern
9 obtaining unit, and the sector pattern; and

10 a sector pattern verifying unit for verifying that
11 the provisional sector pattern is such sector pattern, based
12 on the hamming distance, which is calculated by said first
13 hamming distance calculator,

14 said position recognizing unit recognizing, based on
15 the sector pattern that is verified by said sector pattern

16 verifying unit, a position of each said servo frame in the

17 individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1   19. A storage apparatus as set forth in claim 6,

2 further comprising:

3   a provisional sector pattern obtaining unit for

4 obtaining a provisional sector pattern based on the sector

5 bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7 hamming distance between the provisional sector pattern,

8 which is obtained by said provisional sector pattern

9 obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11 the provisional sector pattern is such sector pattern, based

12 on the hamming distance, which is calculated by said first

13 hamming distance calculator,

14   said position recognizing unit recognizing, based on

15 the sector pattern that is verified by said sector pattern

16 verifying unit, a position of each said servo frame in the

17 individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1   20. A storage apparatus as set forth in claim 7,

2 further comprising:

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3   a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11   the provisional sector pattern is such sector pattern, based

12   on the hamming distance, which is calculated by said first

13   hamming distance calculator,

14   said position recognizing unit recognizing, based on

15   the sector pattern that is verified by said sector pattern

16   verifying unit, a position of each said servo frame in the

17   individual storage area, each said servo frame having such

18   sector bit storing section each storing individual sector

19   bit that is part of the provisional sector pattern.

1   21. A storage apparatus as set forth in claim 8,

2   further comprising:

3   a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11   the provisional sector pattern is such sector pattern, based

12   on the hamming distance, which is calculated by said first

13   hamming distance calculator,

14   said position recognizing unit recognizing, based on

15   the sector pattern that is verified by said sector pattern

16   verifying unit, a position of each said servo frame in the

17   individual storage area, each said servo frame having such

18   sector bit storing section each storing individual sector

19   bit that is part of the provisional sector pattern.

1   22. A storage apparatus as set forth in claim 10,

2   further comprising:

3   a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11   the provisional sector pattern is such sector pattern, based

12   on the hamming distance, which is calculated by said first

13   hamming distance calculator,

14   said position recognizing unit recognizing, based on

15   the sector pattern that is verified by said sector pattern

16   verifying unit, a position of each said servo frame in the

17 individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1 23. A storage apparatus as set forth in claim 13,

2 further comprising:

3 a provisional sector pattern obtaining unit for

4 obtaining a provisional sector pattern based on the sector

5 bits obtained by said sector bit obtaining unit;

6 a second hamming distance calculator for calculating

7 hamming distance between the provisional sector pattern,

8 which is obtained by said provisional sector pattern

9 obtaining unit, and the sector pattern; and

10 a sector pattern verifying unit for verifying that

11 the provisional sector pattern is such sector pattern, based

12 on the hamming distance, which is calculated by said first

13 hamming distance calculator,

14 said position recognizing unit recognizing, based on

15 the sector pattern that is verified by said sector pattern

16 verifying unit, a position of each said servo frame in the

17 individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1 24. A storage apparatus as set forth in claim 14,

2 further comprising:

3 a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11 the provisional sector pattern is such sector pattern, based

12 on the hamming distance, which is calculated by said first

13 hamming distance calculator,

14   said position recognizing unit recognizing, based on

15 the sector pattern that is verified by said sector pattern

16 verifying unit, a position of each said servo frame in the

17 individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1   25. A storage apparatus as set forth in claim 15,

2   further comprising:

3   a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11   the provisional sector pattern is such sector pattern, based

12   on the hamming distance, which is calculated by said first

13   hamming distance calculator,

14   said position recognizing unit recognizing, based on

15   the sector pattern that is verified by said sector pattern

16   verifying unit, a position of each said servo frame in the

17   individual storage area, each said servo frame having such

18   sector bit storing section each storing individual sector

19   bit that is part of the provisional sector pattern.

1   26. A storage apparatus as set forth in claim 16,

2   further comprising:

3   a provisional sector pattern obtaining unit for

4   obtaining a provisional sector pattern based on the sector

5   bits obtained by said sector bit obtaining unit;

6   a second hamming distance calculator for calculating

7   hamming distance between the provisional sector pattern,

8   which is obtained by said provisional sector pattern

9   obtaining unit, and the sector pattern; and

10   a sector pattern verifying unit for verifying that

11   the provisional sector pattern is such sector pattern, based

12   on the hamming distance, which is calculated by said first

13   hamming distance calculator,

14   said position recognizing unit recognizing, based on

15   the sector pattern that is verified by said sector pattern

16   verifying unit, a position of each said servo frame in the

17   individual storage area, each said servo frame having such

18 sector bit storing section each storing individual sector

19 bit that is part of the provisional sector pattern.

1   27. A storage medium having a plurality of round

2   storage areas, on each of which a plurality of servo frames

3   are arranged at uniform intervals in a spoke-like pattern,

4   said medium comprising an index bit storing section provided

5   to each said servo frame arranged in each individual one

6   of said plurality of storage areas, said index bit storing

7   section storing, as an index bit, part of an index pattern

8   having a specific bit pattern, which index pattern is operable

9   to identify the individual storage area,

10   the index bits, each of which is stored in the index

11 bit storing section of each said servo frame arranged in

12 the individual storage area, being adapted to form, when

13 being sequentially arranged, an index bit string which

14 includes a plurality of index patterns each having the

15 specific bit pattern.

1   28. A storage medium as set forth in claim 27, wherein

2   each of said plurality of storage areas is associated with

3   such index pattern that is unique to each said storage area.

1   29. A storage medium as set forth in claim 28, wherein

2   hamming distance between any two of the index patterns, which

3   index patterns are associated one with each of said storage

4   areas, is a predetermined value or greater.

1	30. A storage medium as set forth in claim 27, further

2	comprising a sector bit storing section provided to each

3	said servo frame arranged in each individual one of said

4	plurality of storage areas, said sector bit storing section

5	storing, as a sector bit, part of a sector pattern, which

6	is operable to identify a position of such index pattern

7	in the individual storage area, in association with

8	corresponding index bit storing section,

9	the sector bits, each of which is stored in the sector

10	bit storing section of each said servo frame arranged in

11	the individual storage area, being adapted to form, when

12	being sequentially arranged, a sector bit string that

13	includes the sector pattern.

1	31. A storage medium as set forth in claim 28, further

2	comprising a sector bit storing section provided to each

3	said servo frame arranged in each individual one of said

4	plurality of storage areas, said sector bit storing section

5	storing, as a sector bit, part of a sector pattern, which

6	is operable to identify a position of such index pattern

7	in the individual storage area, in association with

8	corresponding index bit storing section,

9	the sector bits, each of which is stored in the sector

10	bit storing section of each said servo frame arranged in

11	the individual storage area, being adapted to form, when

12	being sequentially arranged, a sector bit string that

13	includes the sector pattern.

1   32. A storage medium as set forth in claim 29, further

2   comprising a sector bit storing section provided to each

3   said servo frame arranged in each individual one of said

4   plurality of storage areas, said sector bit storing section

5   storing, as a sector bit, part of a sector pattern, which

6   is operable to identify a position of such index pattern

7   in the individual storage area, in association with

8   corresponding index bit storing section,

9   the sector bits, each of which is stored in the sector

10   bit storing section of each said servo frame arranged in

11   the individual storage area, being adapted to form, when

12   being sequentially arranged, a sector bit string that

13   includes the sector pattern.

1   33. A storage medium as set forth in claim 30, wherein,

2   in each said storage area, each of said plurality of index

3   patterns is associated with a unique sector pattern that

4   is unique to each said index pattern.

1   34. A storage medium as set forth in claim 31, wherein,

2   in each said storage area, each of said plurality of index

3   patterns is associated with a unique sector pattern that

4   is unique to each said index pattern.

1   35. A storage medium as set forth in claim 32, wherein,

2   in each said storage area, each of said plurality of index

3   patterns is associated with a unique sector pattern that

4   is unique to each said index pattern.

1   36.   A storage medium as set forth in claim 33, wherein
2   hamming distance between any two of the unique sector patterns,
3   which are associated one with each of said index patterns,
4   is a predetermined value or greater.

1   37.   A storage medium as set forth in claim 34, wherein
2   hamming distance between any two of the unique sector patterns,
3   which are associated one with each of said index patterns,
4   is a predetermined value or greater.

1   38.   A storage medium as set forth in claim 35, wherein
2   hamming distance between any two of the unique sector patterns,
3   which are associated one with each of said index patterns,
4   is a predetermined value or greater.